

Conveying apparatus for baking products

3/PRTS
10/539717
JC17 Rec'd PCT/PTO 20 JUN 2005

The invention relates to a conveying apparatus for baking products, where a conveying unit, which is connected to a heating device, is connected at the one side to a supplying apparatus and at the other side to a removal apparatus.

These types of conveying apparatuses for baking products are in the form, for example, of conveyor belts.

It is the object of the invention to configure a conveying apparatus of the aforementioned type for the conveying of baking products in such a manner that the design is compact and simple and produces reliable conveying.

This object is achieved with the measures in claim 1. It is accordingly provided here that the conveying unit includes a helical face that can be set to vibrate by means of an oscillating drive for the conveying of the baking products upwards, wherein the supplying apparatus is connected in the lower region of the conveying unit and the removal apparatus is connected in the upper region of the conveying unit.

Advantageous developments are specified in the sub claims. The inclination of the helical face, in this case, can easily be selected in a suitable manner in order to obtain the desired conveying speed using the oscillating drive. The vibrations generated by the oscillating drive for the conveying can also be adapted in form and intensity to the desired conveying speed and also to the type of baking product.

An advantageous development, in this case, is that the hollow, more especially cylindrical central section is included in a recirculating air heating circuit which is conducted over the helical face, wherein the hot air is conducted downwards over the spirals and in the hollow central section flows upwards in order to heat-up the baking products in the desired manner.

Another advantageous development is that the helical face includes some steps, for example one after each 400° , wherein the steps are configured in such a manner that the baking products are turned when they exceed the step.

An advantageous development of the conveying unit consists in that the oscillating drive includes two out-of-balance drive units, the force vectors of which are aligned inclined to the vertical and inclined to each other. This design of the oscillating drive produces a relatively high degree of efficiency in a small model. In this case, relatively low frequencies and resultant low acceleration can be selected, the drive thereby operating in a relatively quiet manner.

If it is provided that the removal apparatus is disposed above the supplying apparatus on the same side of the conveyor unit, the arrangement is favourable for operation when loading and unloading and the possibilities for the positioning of the apparatus are favourable.

The functioning and operating are additionally favoured in that the supplying apparatus includes a supplying section, which is connected to the conveying unit and is provided with a singling-out function, and a loading unit, which leads downwards to said supplying section and is set at an incline or is adjustable at an incline relative to said supplying section.

Additionally advantageous to the functioning is the fact that, for the supplying of the baking products, the supplying section and the loading unit are drivable by means of one common supplying drive or by means of separate supplying drives. Using these measures, the cold, uncooked baking products, which are often still frozen, are conveyed in a reliable manner from the loading unit to the supplying section and from there into the conveying unit.

If it is provided that the supplying apparatus includes an individual loading section, which is connected to the supplying section, baking products can be introduced into a baking sequence according to the wishes of the user.

Advantageous to the functioning and operating of the apparatus are additionally the measures whereby the removal apparatus includes a removal section, which is connected to the upper end region of the helical face, and an output section, which leads inclinedly downwards to a removal apparatus.

A development that is advantageous to the operation of the apparatus consists, in addition, in that the heat of the baking products situated in the removal apparatus is conducted in part to the baking products situated in the supplying apparatus.

The invention is described in more detail below by way of exemplified embodiments with reference to the drawings. In which:

Figures 1A to 1D

show a front view, side view from the left and top view of an upper level of a first exemplified embodiment of a conveying apparatus for baking products with a removal apparatus and a top view of the same of a lower level with a supplying apparatus,

Figure 2 shows a front view, side view from the left and a top view of another exemplified embodiment of the conveying apparatus and

Figure 3 is a cutout from a conveying unit in Figures 1A to 1D and 2.

Figures 1A to 1D show four different views of a conveying device, that-is-to-say a front view, a view from one supplying side and two views from above, wherein Figure 1C shows a lower supplying level and Figure 1D shows an upper removal level. The baking products are supplied by a supplying

apparatus 2 in the form of uncooked products into a chamber 1.6 in the conveying unit 1, said chamber 1.6 being disposed in the lower region of a conveying unit 1, and from this chamber they are conducted further via another chamber 3.4 in the upper region, for example on the same side (Figures 1A to 1D) or on the oppositely situated side (Figure 2) with reference to the supplying apparatus 2, to be removed via a removal apparatus 3.

The conveying unit 1 includes a helical face 1.2, which is wound about a hollow cylindrical central section 1.3 and, as can be seen in Figure 3, has a plurality of turning steps 1.5. An oscillating drive 1.1 is disposed in the lower region of the conveying unit underneath the helical face 1.2 in order to make the helical face carry out vibration movements that convey the baking products upwards. The oscillating drive 1.1, in this case, has, for example, two drive units, which include imbalances rotating about a respective axis, wherein the vectors of the power components generated by the imbalances are aligned inclinedly one to another and, for example, at the same angle relative to the vertical in order to effect the desired forward conveying over the helical face 1.2. Magnetic vibrators would also be conceivable. By means of the coordination of the steps with the characteristics of the baking products, with the vibratory movements and with the inclination of the helical face 1.2, the baking products are turned when passing over the steps and are conveyed in the desired position until the next step where they are turned once again. A plurality of steps, for example between two and ten steps or where desired even fewer can be provided per revolution about, for example, 400° of the helical face 1.2.

The conveying unit 1 is also used for heating-up the baking products, wherein the hot air is conducted downwards by a heating apparatus 4, which is situated for example up above, in a recirculating air heating circuit 1.4 over the helical face 1.2 and is then conducted through the interior of the central section 1.3 back upwards.

As can also be seen in Figures 1A to 1D, the supplying apparatus 2 includes various supplying sections, that-is-to-say one supplying section 2.3 which is

connected to the inlet chamber 1.6, to which supplying section 2.3 uncooked baking products can be supplied from a loading unit 2.4 and/or from an individual loading section 2.1 for example via a turning section 2.2 which is connected thereto. The individual loading section 2.1, in this case, is disposed, for example, on a rear side of the conveying apparatus oppositely situated to a removal apparatus 3.3 for the finished baking products and it enables, according to the wishes of an operator or a customer, various baking products to be locked into a baking process according to type and number.

The loading unit 2.4 is, for example, configured in the form of a pivotable supplying container, which, for loading purposes is pivotable into a horizontal position and for supplying the filled-in uncooked baking products is pivotable into a position inclined relative to the supplying section 2.3. The supplying of the uncooked baking products out of the loading unit 2.4 to the supplying section 2.3 is effected by means of gravity via the inclination and additionally by means of vibration, such that, as a rule, cold, uncooked baking products, which are still frozen, are conveyed to the supplying section 2.3 securely and already singled-out to a certain degree and then, with further singling-out by means of chicanes (deflectors), are conveyed from the supplying section 2.3 to the conveying unit 1. The supplying section 2 also has, in an advantageous manner, an oscillating drive, a magnetic vibrating means being suitable for this at this point. The supplying from the individual loading section 2.1 via the turning section 2.2 can be effected in a corresponding manner using an oscillating drive or, for example, by means of a circulating belt. A circulating conveyor belt is also conceivable as an alternative for the supplying section 2.3.

The removal apparatus 3, which is disposed above the supplying apparatus 2, includes a removal section 3.1, which, for example, can also be provided with an oscillating drive or with a circulating conveyor belt. An output section 3.2, which descends inclinedly forwards and terminates in the removal apparatus 3.3, is connected to the removal section 3.1, for example, over the overall length of the same in the design shown, which corresponds to the width of the overall removal apparatus 3 and also supplying apparatus 2. At the removal

apparatus 3.3, a customer, for example, can remove finished baking products by means of a suitable container connected thereto. The removal section 3.1 can be provided with a singling-out apparatus, which is coupled to sensors, such that different baking products can be sorted out and supplied to associated removal places (Figures 1A).

Through the disposition of the removal apparatus 3 above the supplying apparatus 2, the heat of the baking products more especially situated on the output section 3.2 can be used to heat-up the uncooked baking products situated in the loading unit 2.4.

In the case of the exemplified embodiment shown in Figure 2, the supplying apparatus 2 and the removal apparatus 3 are disposed on two oppositely situated sides of the conveying unit 1. For the remainder, the design can be carried out in a similar manner to the exemplified embodiment in Figures 1A to 1D.

Translation of Figures**Figure 3****German****English****Transportstrecke abgewickelt****Unwound conveying section**